# Foundry AR-Series Rack-Mounted Router
# Quick Installation Guide

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# Contents


## CHAPTER 1
## GETTING STARTED ..... 1-1

INTRODUCTION ..... 1-1
AUDIENCE ..... 1-1
NOMENCLATURE ..... 1-1
RELATED PUBLICATIONS ..... 1-2
LIST OF FEATURES ..... 1-2
HOW TO GET HELP ..... 1-5
- WEB ACCESS ..... 1-5
- EMAIL ACCESS ..... 1-5
- TELEPHONE ACCESS ..... 1-5

WARRANTY COVERAGE ..... 1-5

## CHAPTER 2
## INSTALLING AND CONFIGURING RACK-MOUNTED SYSTEMS ..... 2-1

BEFORE YOU BEGIN ..... 2-1
- UNPACKING AND INSPECTING ..... 2-1
- ADDITIONAL CABLES, TOOLS, AND MATERIALS ..... 2-1
- INSTALLATION SITE ..... 2-2

PORTS AND CONNECTIONS ..... 2-2
- DIAL-OUT PORTS ..... 2-4
- CONSOLE CABLE ..... 2-4
- ETHERNET, E1, T1, CT3, CLEAR CHANNEL DS3, AND USSI ..... 2-4
- ALARMS ..... 2-5
- POWER ..... 2-5

MANAGEMENT INTERFACE ..... 2-5
- INITIAL CONFIGURATION ..... 2-5

INTERFACE CONFIGURATION ..... 2-6
- T1 INTERFACE ..... 2-7
- E1 INTERFACE ..... 2-7


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BUNDLE CONFIGURATION .....2-7
FRACTIONAL T1/CISCO-COMPATIBLE HDLC BUNDLE .....2-8
T1OR E1/PPP BUNDLE .....2-8
ROUTING CONFIGURATION .....2-8
RIP .....2-8
OSPF .....2-8
BGP4 .....2-9
NXE1/MFR BUNDLE .....2-10
FRACTIONAL E1/CISCO-COMPATIBLE HDLC BUNDLE .....2-10
SAVING CONFIGURATIONS .....2-10
LEDS .....2-11

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# Chapter 1
# Getting Started

## Introduction

This guide describes how to install and configure a rack-mounted AR1208-T, AR1208-E, AR1216-T, AR1216-E, AR3201-T-CL, AR3202-T-CL, AR3201-T-CH, and AR3202-T-CH router.

## Audience

This manual is designed for system administrators with a working knowledge of Layer 2 and Layer 3 switching and routing.

If you are using a Foundry Layer 3 Switch, you should be familiar with the following protocols if applicable to your network – IP, RIP, OSPF, BGP4, IGMP, PIM, and VRRP.

## Nomenclature

This guide uses the following typographical conventions to show information:

| | |
|---|---|
| *Italic* | highlights the title of another publication and occasionally emphasizes a word or phrase. |
| **Bold** | highlights a CLI command. |
| ***Bold Italic*** | highlights a term that is being defined. |
| Underline | highlights a link on the Web management interface. |
| Capitals | highlights field names and buttons that appear in the Web management interface. |

**NOTE:** A note emphasizes an important fact or calls your attention to a dependency.

**WARNING:** A warning calls your attention to a possible hazard that can cause injury or death.

**CAUTION:** A caution calls your attention to a possible hazard that can damage equipment.


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## Related Publications

The following Foundry Networks documents supplement the information in this guide.

- Release Notes

  Printed release notes provide the latest information. If release notes are provided with your product, follow the instructions contained within them instead of those provided in other documentation.

- *Foundry AR-Series Rack-Mounted Router Installation Guide*

  This detailed guide provides detailed installation and configuration steps for installing Foundry AccessIron rack-mounted routers.

- *Foundry AR-Series Router Configurations Guide*

  This guide provides examples of AccessIron configurations.

- *Foundry AR-Series Router Command Reference Guide*

  This guide explains the syntax and application of AccessIron router CLI commands.

- *Foundry AR-Series Router User Guide*

  This guide explains the AccessIron router features.

To order additional copies of these manuals, do one of the following:

- Call 1.877.TURBOCALL (887.2622) in the United States or 1.408.586.1881 outside the United States.
- Send email to info@foundrynet.com.

## List of Features

June 2004Table 1.1 shows the features supported on AccessIron devices.

**Table 1.1: Feature Supported in AccessIron Devices**

| Category | Feature | AR1202<br>AR1204<br>AR1208<br>AR1216 | AR3201-T-CL<br>AR3202-T-CL | AR3201-T-CH<br>AR3202-T-CH |
|---|---|---|---|---|
| **Interfaces** | | | | |
| WAN/LAN | 10/100 Fast Ethernet | 2 | 2 | 2 |
| | T1/E1 | Yes | - | - |
| | Channelized T3 | - | - | Yes |
| | Clear Channel T3 | - | Yes | - |
| **WAN Protocols** | | | | |
| PPP, PAP, Multilink PPP, Frame Relay, Multilink Frame Relay, (FRF.15, FRF.16.1) BCP, HDLC | | | | |
| **Layer 2 Features** | | | | |
| | 802.1Q VLAN tagging and forwarding over WLAN | | | |
| | Virtual LAN Domain (VLD) VLAN Double Tagging | | | |
| | Transparent Bridging | | | |
| | Jumbo Frames (4072 bytes) | | | |


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**Table 1.1: Feature Supported in AccessIron Devices (Continued)**

| Category | Feature | AR1202<br>AR1204<br>AR1208<br>AR1216 | AR3201-T-CL<br>AR3202-T-CL | AR3201-T-CH<br>AR3202-T-CH |
|---|---|---|---|---|
| | IP Multiplexing | | | |
| | NAT mode | | | |
| | Transparent Layer 3 packet forwarding | | | |
| **Layer 3 Features** | | | | |
| Routing | RIPv1/v2 | | | |
| | OSPF | | | |
| | BGP4 | | | |
| | Static Routing | | | |
| | ECMP (IP load balancing) | | | |
| | Multicast (PIM-SM, PIM-SSM, IGMP v2/v3) | | | |
| High Availability | VRRP | | | |
| | BGP4 Multi-homing | | | |
| | Bundle Tracking | | | |
| | MLPPP Bundle Thresholding | | | |
| | LAN Interface Load Sharing with Failover | | | |
| Security/ Management | Stateful Packet Inspection Firewall with:<br>Layer-3 mode (router and NAT)<br>Policy-based NAT/PAT<br>Policy-based filters<br>URL and application content filtering<br>Time and rate limiting<br>Denial of Service protection<br>Network attack detection<br>Application Level Gateway support<br>Packet-level logging and syslog support | | | |


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**Table 1.1: Feature Supported in AccessIron Devices (Continued)**

| Category | Feature | AR1202<br>AR1204<br>AR1208<br>AR1216 | AR3201-T-CL<br>AR3202-T-CL | AR3201-T-CH<br>AR3202-T-CH |
|---|---|---|---|---|
| | ACLs | | | |
| | DHCP | | | |
| | TFTP | | | |
| | PAP | | | |
| | RADIUS | | | |
| | TACACS+ | | | |
| | SSH v2 | | | |
| | GRE Tunneling | | | |
| | IPSec VPN with integrated IKE<br>Site-to-site VPN<br>Site-to-remote VPN<br>MD5 & SHA-1 authentication<br>Hardware accelerated encryption<br>3DES (168 bit), DES (56 bit), AES (256 bit) encryption | VPN optional on the AR1202 and AR1204 | - | - |
| QoS/Traffic Management | RED | | | |
| | DiffServ | | | |
| | Class-based Queuing per:<br>IP address<br>Flow<br>VLAN tag<br>Application port | | | |
| | Frame Relay traffic shaping and policing | | | |
| | VLAN-802.1P 8 queue prioritization of VLAN frames | | | |
| Service Provisioning | Management (in-band, serial, Telnet, or modem) by:<br>CLI<br>SNMP | | | |
| | Monitoring<br>syslog<br>Statistics<br>Alarms | | | |
| | Diagnostics<br>BERT<br>Loopback testing<br>Traceroute<br>Reverse Telnet | | | |
| Specialized Features | Hospitality Web Redirection | | | |


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**Table 1.1: Feature Supported in AccessIron Devices (Continued)**

| Category | Feature | AR1202<br>AR1204<br>AR1208<br>AR1216 | AR3201-T-CL<br>AR3202-T-CL | AR3201-T-CH<br>AR3202-T-CH |
|---|---|---|---|---|
| | Timed Access List | | | |

# How to Get Help

Foundry Networks technical support will ensure that the fast and easy access that you have come to expect from your Foundry Networks products will be maintained.

## Web Access

- http://www.foundrynetworks.com

## Email Access

Technical requests can also be sent to the following email address:

- support@foundrynet.com

## Telephone Access

- 1.877.TURBOCALL (887.2622) United States
- 1.408.586.1881 Outside the United States

# Warranty Coverage

Contact Foundry Networks using any of the methods listed above for information about the standard and extended warranties.


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# Chapter 2
# Installing and Configuring Rack-Mounted Systems

## Before You Begin

### Unpacking and Inspecting

The following items are shipped with these systems.

- ❑ Foundry system
- ❑ AC power cord
- ❑ RJ-45 console cable
- ❑ Male DB-9 modular adapter
- ❑ Female DB-9 modular adapter
- ❑ Four self-adhering rubber feet
- ❑ Quick start guide
- ❑ Two 19-inch (48.26 cm) rack-mount brackets
- ❑ Two 23-inch (58.42 cm) rack-mount brackets
- ❑ Four #6 screws
- ❑ Four each #6 flat washers and #6 lock washers
- ❑ *Product Documentation* CD-ROM
- ❑ Registration card
- ❑ Warranty form

If any of the above items are missing or defective, contact Foundry.

### Additional Cables, Tools, and Materials

The following additional cables are required for integrating these systems with other networking devices.

- RJ-45, male/male, Category 5, shielded, twisted pair cable (Ethernet ports)
- RJ-48C, male/male, shielded, straight-through cable (T1/E1 ports)
- RG-59 coaxial cables with BNC connectors (Clear Channel DS3 and CT3)

The following tools are required for installation.

- #3 Phillips screwdriver (rackmount)
- #2 Phillips screwdriver (mounting bracket)
- 1/8 inch (3 mm) flat-blade screwdriver (DC power, ground, and external alarm)
- wire stripping tool (DC power and external alarm)

The following additional materials are required for connecting DC power, ground, and external alarms to the Foundry system.

- 18-22 AWG wire (external alarm and ground)
- 18 AWG wire (DC power)


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### Installation Site

These systems are designed to be installed in a 19- or 23-inch (48.26 or 58.42 cm) rack or on a flat, stable surface with sufficient space to accommodate a 12- x 19-inch (30.48 x 48.26 cm) footprint. The installation site should provide ample room for connecting cables and performing maintenance, and the site should not be subject to extreme temperature shifts. The Foundry system should be located in close proximity to all relevant telecommunication ports and power supplies.

## Ports and Connections

The following diagrams and sections identify models and provide information about connecting AC and DC power, network cables, and alarm and ground wires.


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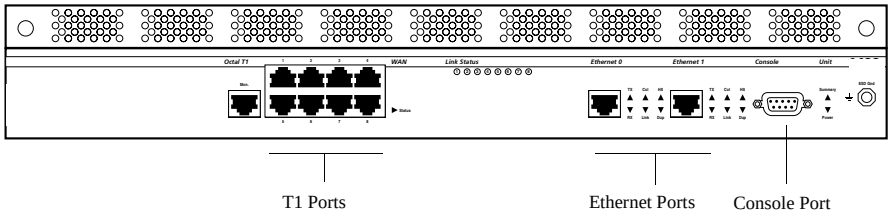
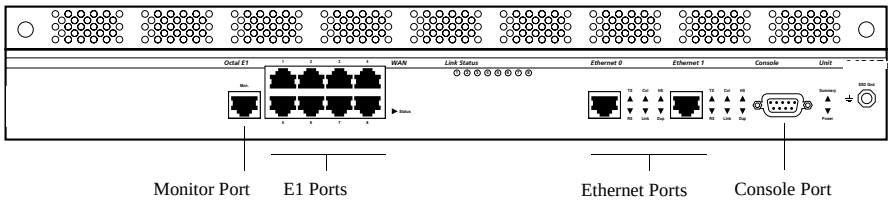
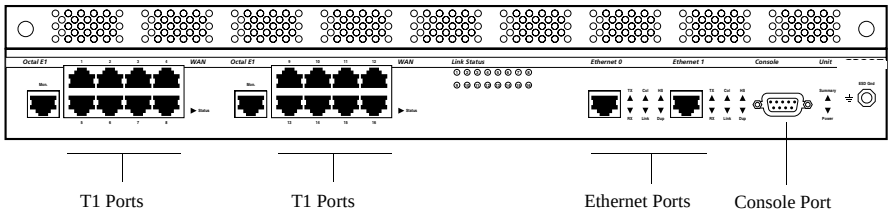
## AR1208-T



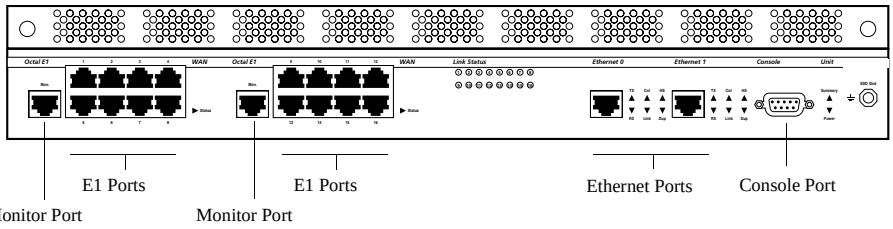

## AR1208-E



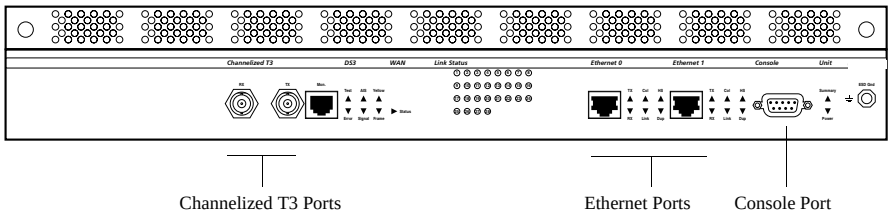

## AR1216-T



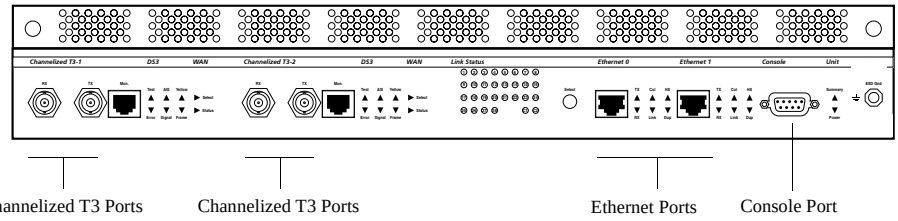

## AR1216-E




## AR3201-T-CH




## AR3202-T-CH





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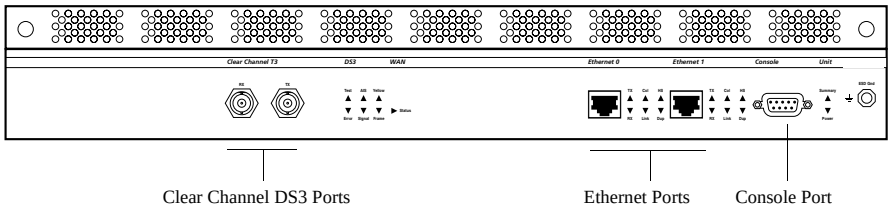
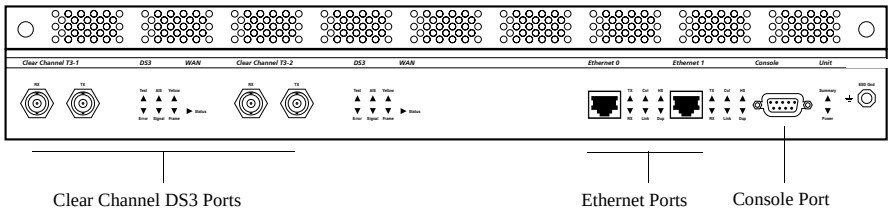
### AR3201-T-CL




### AR3202-T-CL



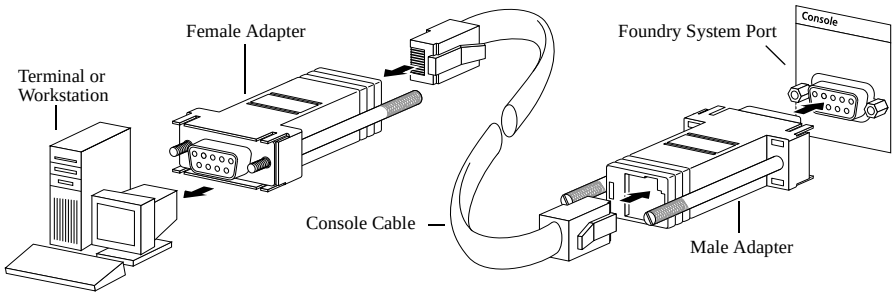

## Dial-Out Ports

The AR3202-T-CL, and AR3202-T-CH have a dial-out port on the back panel that is used to notify the network administrator or other designated person about captured system traps. Notification procedures can be set up to meet the needs of the customer via pager or phone message.

## Console Cable

Connect the:

- DB-9 modular adapters to the supplied RJ-45 cable
- Male DB-9 modular adapter to the console port
- Female DB-9 modular adapter to a terminal or PC




## Ethernet, E1, T1, CT3, Clear Channel DS3, and USSI

Connect the:

- RJ-45 connector of an Ethernet cable to the Ethernet 0 or 1 port
- RJ-48C connectors of the T1 cables to the T1/E1 ports (AR1208)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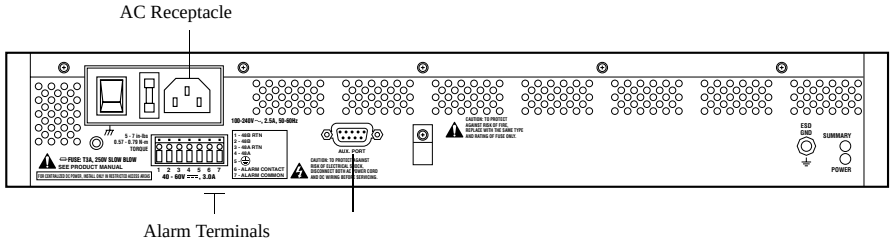
## Alarms

Connect the stripped ends of two 18-22 AWG wires to alarm terminals 6 and 7 on the back-panel terminal block.



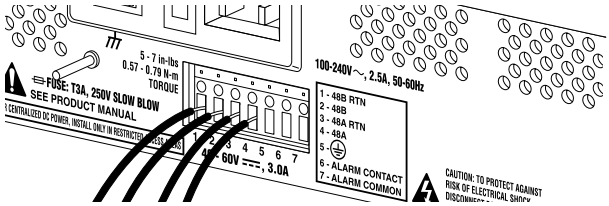

## Power

Foundry systems operate on AC, single DC, and dual DC power. For AC power operation, connect the female end of the supplied AC power cord to the AC power receptacle on the system back panel. Connect the male end of the AC cord to a standard 110/120 VAC source. Refer to the figure above. Refer to the *Installation Guide: Domestic Products* for information about dual AC power connection.

To operate with single-source DC power, connect the stripped ends of two 18-AWG wires to either the A or B terminals on the terminal block. Make sure to connect the +48V lead to the appropriate RTN connector.

**CAUTION:** To avoid equipment damage, make sure that the +48V lead is connected to the appropriate RTN connector (either 1 or 3) on the terminal block.

To operate with dual-source DC power, connect the stripped ends of four 18-AWG wires to the both the A and B terminals on the terminal block. Make sure to connect the +48V leads to the appropriate RTN connectors.




# Management Interface

To access the command line interface (CLI) via the front-panel console port, connect a terminal or a workstation running a terminal emulation software to the Foundry system. The software should be configured as follows:

- 9600 bps
- 8 data bits
- 1 stop bit
- No parity
- XON/XOFF flow control

To remotely access the system, configure the modem data port as specified above for terminal emulation software. It is also possible to telnet to the Foundry system once an IP address is assigned to an Ethernet port.

## Initial Configuration

Use the following commands to log in as the system administrator, choose a host name, change the password, set the system time, and enter an Ethernet IP address.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### Logging In

**EXAMPLE:Login: foundry**

**EXAMPLE:Password: foundry**

### Choosing a Host Name

**EXAMPLE:AR1208# configure term**

**EXAMPLE:AR1208/configure# hostname ISP_name**

### Changing the Password

**EXAMPLE:AR1208# password**

**EXAMPLE:name: foundry**

**EXAMPLE:old password: foundry**

**EXAMPLE:new password: new_pass**

**EXAMPLE:re-enter password: new_pass**

Passwords are case-sensitive and must be a minimum of three to a maximum of eight characters. Make a note of the password that you use.

### Setting the System Date and Time

**EXAMPLE:AR1208# configure term**

**EXAMPLE:AR1208/configure# date - 0 0 mo 3 d 19 y 2000 h 14 mi 40 s 35**

The first portion of this command, **date - 0 0**, establishes offset from GMT. The minus sign inputs offset direction, and the two numbers input offset hours and minutes. The second portion of this command, **mo 3 d 19 y 2000 h 14 mi 40 s 35**, inputs the local month, day, year, hour, minute, and second.

### Entering an Ethernet IP Address and Subnet Mask

**EXAMPLE:AR1208# configure term**

**EXAMPLE:AR1208/configure# interface ethernet 0**

**EXAMPLE:AR1208/configure/interface/ethernet 0# ip address 10.1.100.28 255.255.255.0**

## Interface Configuration

The following are examples of T1, CT3, and DS3 interface configurations. To scroll through the options available at any command prompt, press the Tab key. For descriptions of the options available at any command prompt, type **help** and press Enter.


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### T1 Interface

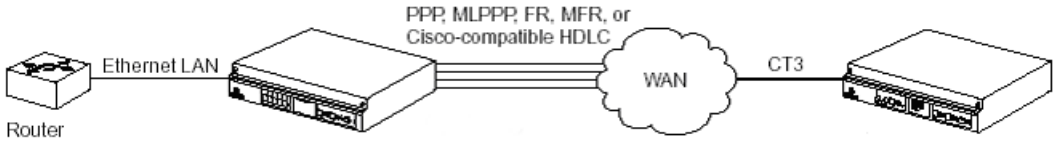
**EXAMPLE:AR1208-T# configure term**
**EXAMPLE:AR1208-T/configure# module t1 4**
**EXAMPLE:AR1208-T/configure/module/t1 4# clock_source line**
**EXAMPLE:AR1208-T/configure/module/t1 4# framing esf**
**EXAMPLE:AR1208-T/configure/module/t1 4# linecode b8zs**
**EXAMPLE:AR1208-T/configure/module/t1 4# yellow_alarm gen_det**
**EXAMPLE:AR1208-T/configure/module/t1 4# exit 3**

### E1 Interface

**EXAMPLE:AR1208-E# configure term**
**EXAMPLE:AR1208-E/configure# module e1 4**
**EXAMPLE:AR1208-E/configure/module/e1 4# clock_source line**
**EXAMPLE:AR1208-E/configure/module/e1 4# framing crc**
**EXAMPLE:AR1208-E/configure/module/e1 4# exit 2**
**EXAMPLE:AR1208-E/configure# cabletype monitor_port 1 twisted_pair**
**EXAMPLE:AR1208-E/configure# module e1 4**
**EXAMPLE:AR1208-E/configure/module/e1 4# linecode hdb3**
**EXAMPLE:AR1208-E/configure/module/e1 4# yellow_alarm gen_det**
**EXAMPLE:AR1208-E/configure/module/e1 4# exit 3**

## Bundle Configuration

Foundry systems support PPP, MLPPP, FR, MFR, and Cisco-compatible HDLC for WAN data transmission.




**NOTE:** Bundle names cannot exceed eight characters.

The following are examples of bundles configured for T1/E1, fractional T1/E1, and NxT1/NxE1 transmission.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### Fractional T1/Cisco-compatible HDLC Bundle

**EXAMPLE:AR1208-T# configure term**
**EXAMPLE:AR1208-T/configure# interface bundle Denver**
**EXAMPLE:AR1208-T/configure/interface/bundle Denver# link t1 3:1-6**
**EXAMPLE:AR1208-T/configure/interface/bundle Denver# encapsulation hdlc**
**EXAMPLE:AR1208-T/configure/interface/bundle Denver# hdlc keepalive 20**
**EXAMPLE:AR1208-T/configure/interface/bundle Denver# ip address 192.168.2.1 255.255.255.0**
**EXAMPLE:AR1208-T/configure/interface/bundle Denver# exit 3**

### T1or E1/PPP Bundle

**EXAMPLE:AR1208-T# configure term**
**EXAMPLE:AR1208-T/configure# interface bundle Boston**
**EXAMPLE:AR1208-T/configure/interface/bundle Boston# link t1 4**
**EXAMPLE:AR1208-T/configure/interface/bundle Boston# encapsulation ppp**
**EXAMPLE:AR1208-T/configure/interface/bundle Boston# ip address 199.1.1.1 255.255.255.0**
**EXAMPLE:AR1208-T/configure/interface/bundle Boston# exit 3**

## Routing Configuration

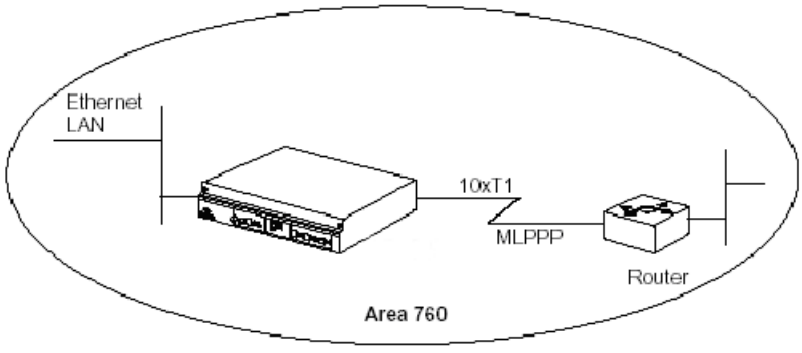
Foundry products support RIP, OSPF, and BGP4 routing protocols.

### RIP

Configuring RIP for Ethernet 0 and WAN 1 interfaces.

**EXAMPLE:AR1208# configure terminal**
**EXAMPLE:AR1208/configure# router rip**
**EXAMPLE:AR1208/configure/router rip# interface ethernet0**
**EXAMPLE:AR1208/configure/router rip/interface ethernet0# exit**
**EXAMPLE:AR1208/configure/router rip# interface wan1**
**EXAMPLE:AR1208/configure/router rip/interface wan1# exit 3**

### OSPF




Configuring OSPF between a LAN and a WAN running MLPPP.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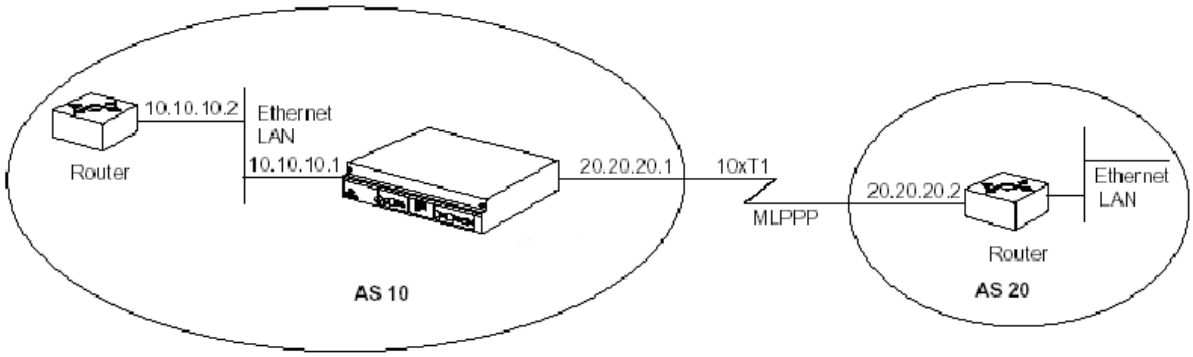
**EXAMPLE:AR1208-T# configure terminal**
**EXAMPLE:AR1208-T/configure# interface ethernet 0**
**EXAMPLE:AR1208-T/configure/interface/ethernet 0# ip address 10.10.10.1 24**
**EXAMPLE:AR1208-T/configure/interface/ethernet 0# exit 2**
**EXAMPLE:AR1208-T/configure# interface bundle Dallas**
**EXAMPLE:AR1208-T/configure/interface/bundle Dallas# link ct3 1 1-10**
**EXAMPLE:AR1208-T/configure/interface/bundle Dallas# encapsulation ppp**
**EXAMPLE:AR1208-T/configure/interface/bundle Dallas# ip address 20.20.20.1 24**
**EXAMPLE:AR1208-T/configure/interface/bundle Dallas# exit 2**
**EXAMPLE:AR1208-T/configure# router routerid 10.10.10.1**
**EXAMPLE:AR1208-T/configure# router ospf**
**EXAMPLE:AR1208-T/configure/router/ospf# area 760**
**EXAMPLE:AR1208-T/configure/router/ospf/area 760# exit**
**EXAMPLE:AR1208-T/configure/router/ospf# interface Dallas area_id 760**
**EXAMPLE:AR1208-T/configure/router/ospf/interface Dallas# cost 10**
**EXAMPLE:AR1208-T/configure/router/ospf/interface Dallas# exit**
**EXAMPLE:AR1208-T/configure/router/ospf#interface ethernet0 area_id 760**
**EXAMPLE:AR1208-T/configure/router/ospf/interface ethernet0# cost 10**
**EXAMPLE:AR1208-T/configure/router/ospf/interface ethernet0# priority 0**
**EXAMPLE:AR1208-T/configure/router/ospf/interface ethernet0# exit 3**

## BGP4




Configuring EBGP between two different autonomous systems.

**EXAMPLE:AR1208-T/configure# interface bundle Chicago**
**EXAMPLE:AR1208-T/configure/interface/bundle Chicago# link ct3 1 1-10**
**EXAMPLE:AR1208-T/configure/interface/bundle Chicago# encapsulation ppp**
**EXAMPLE:AR1208-T/configure/interface/bundle Chicago# ip address 20.20.20.1 24**
**EXAMPLE:AR1208-T/configure/interface/bundle Chicago# exit**
**EXAMPLE:AR1208-T/configure# router bgp 10**
**EXAMPLE:AR1208-T/configure/router/bgp 10# neighbor 20.20.20.2 20**
**EXAMPLE:AR1208-T/configure/router/bgp 10/neighbor 20.20.20.2 20# exit 3**
Configuring IBGP between two neighbors in the same autonomous system.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**EXAMPLE:AR1208-T/configure# interface ethernet 0**

**EXAMPLE:AR1208-T/configure/interface/ethernet 0# ip address 10.10.10.1 24**

**EXAMPLE:AR1208-T/configure/interface/ethernet 0# exit**

**EXAMPLE:AR1208-T/configure# router bgp 10**

**EXAMPLE:AR1208-T/configure/router/bgp 10# neighbor 10.10.10.2 10**

**EXAMPLE:AR1208-T/configure/router/bgp 10/neighbor 10.10.10.2 10# exit 3**

Redistributing static and connected routes.

**EXAMPLE:AR1208-T/configure# ip route 9.9.0.0 255.255.0.0 10.10.10.10**

**EXAMPLE:AR1208-T/configure# router bgp 10**

**EXAMPLE:AR1208-T/configure/router/bgp 10# redistribute static**

**EXAMPLE:AR1208-T/configure/router/bgp 10# redistribute connected**

**EXAMPLE:AR1208-T/configure/router/bgp 10# exit 2**

### NxE1/MFR Bundle

**EXAMPLE:AR1208-E# configure term**

**EXAMPLE:AR1208-E/configure# interface bundle Madrid**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid# link e1 3-4**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid# encapsulation fr**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid# fr**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid/fr# intf_type dce**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid/fr# lmi**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid/fr/lmi# keepalive 12**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid/fr/lmi# exit**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid/fr# pvc 16**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid/fr/pvc 16# shaping cir 1920000**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid/fr/pvc 16# exit**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid/fr# enable interface**

**EXAMPLE:AR1208-E/configure/interface/bundle Madrid/fr# exit 4**

### Fractional E1/Cisco-compatible HDLC Bundle

**EXAMPLE:AR1208-E# configure term**

**EXAMPLE:AR1208-E/configure# interface bundle London**

**EXAMPLE:AR1208-E/configure/interface/bundle London# link e1 3:1-6**

**EXAMPLE:AR1208-E/configure/interface/bundle London# encapsulation hdlc**

**EXAMPLE:AR1208-E/configure/interface/bundle London# hdlc keepalive 20**

**EXAMPLE:AR1208-E/configure/interface/bundle London# ip address 192.168.2.1 255.255.255.0**

**EXAMPLE:AR1208-E/configure/interface/bundle London# exit 3**

## Saving Configurations

Use the following command to save new configurations to system memory.

**EXAMPLE:AR1208# write mem**

Use the following command to save new configurations to a network host for archiving and back-up purposes. Identify the host name or IP address, the host directory the file is being transferred to, and the new name as follows.

**EXAMPLE:AR1208# save network 10.1.100.149 /maindir/config01.txt**

When saving to a network host, the host directory and file name must pre-exist.

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# LEDs

The Foundry system front-panel LEDs indicate real-time unit status. The following table provides information about how to interpret the various LED states. For more detailed LED descriptions, refer to the Foundry *Installation Guide: Domestic Products*.

| LED State | Description |
|---|---|
| Off | Indicates an absence of power, a deselected function, or an out-of-service link |
| Green | Indicates either an engaged or a properly functioning feature |
| Yellow | Indicates an out-of-service test or a failed DC converter (Power LED) |
| Green or yellow with blinking red | Same as above conditions for green and yellow, but one or more of the following errors have been detected on a T1 port:<br>Framing bit errors<br>CRC-6 errors (in ESF mode)<br>Line code violations |
| Red | Indicates either an error, an alarm, or a loss of signal |


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